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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/649,539	08/28/2000	Masato Tanaka	6715/62963	8465

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EXAMINER	
WEST, JEFFREY R	

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2857	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/649,539	Applicant(s) TANAKA ET AL.
	Examiner Jeffrey R. West	Art Unit 2857

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 October 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 14-17* is/are rejected.

7)☒ Claim(s) *2-13* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 August 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,140,245 to Stacey in view of U.S. Patent No. 5,734,172 to Pryor et al. and U.S. Patent No. 5,432,443 to Maejima et al.

Stacey discloses a position detection apparatus for generating a signal representing the absolute angular position of a rotating shaft (column 3, lines 4-6) comprising three operational integrators that obtain voltage signals representing phase (column 3, lines 17-25), a phase locked loop containing phase comparators, in the form of multiplying digital to analog converters, which receive the phase signal from the operational integrators to generator a phase error signal (column 3, lines 39-54), and a means for generating a total phase error signal using an adder that sums the values of the individual phase errors, and an error integrator, that integrates the phase error signal to obtain a speed/velocity error signal (column 4, lines 4-7). Stacey also includes an absolute value circuit that applies the phase error signal, functioning as a frequency control signal, to a frequency controlled oscillator that generates a periodic pulse signal having a variable frequency

proportional to the phase error signal (column 3, lines 54-59), and a low pass filter that filters the high frequency component from the received signal magnitude and outputs the smoothed filtered signal to a comparator for indicating the presence the phase error (column 4, lines 14-19).

Stacey also discloses operation of the phase locked to keep the size of the phase error, output by the multiplying digital to analog converters (as noted above, functioning as a phase comparator), exactly zero. To keep this phase error zero, Stacey describes temporarily increasing or decreasing the frequency (i.e. adjusting the gain, since the gain of the phase integrator is inversely proportional to the frequency (column 3, lines 20-21)) of the of the frequency controlled oscillator, to control the outputted periodic pulse signal, using an absolute value circuit that determines the absolute value of the phase error output by the phase comparator (column 4, lines 65-68). Stacey also discloses outputting an angular position of the device being tested (column 3, lines 5-6 and 39-41).

With respect to claims 12 and 13, although Stacey does not specifically disclose adjusting the gain of the signal when the absolute value of the phase error exceeds a predetermined level, it is inherent that in order for the absolute value circuit to decrease the gain/frequency of the frequency controlled oscillator when the phase error output by the summing junction becomes positive (column 5, lines 5-12), that the absolute value circuit must have the value of zero set as a predetermined threshold and adjust the gain when the predetermined threshold is exceeded (i.e. the error becomes positive) for some period of time.

As noted above, the invention of Stacey does include obtaining signals from the device in both magnitude and phase form, but does not specifically describe converting the position signal into polar coordinates, angle and amplitude, or specify that the detection section comprise two detection heads, spaced apart, that move along a recording medium to read a periodic position signal.

Pryor teaches a method and apparatus for determining the dimension, location, and attitude of objects comprising two sensors located on opposite sides of a detection head (column 10, line 66 to column 11, line 6) wherein measurements taken by the sensors, to determine the parameters of a mechanical system that specifically require lead deviation (i.e. amplitude) and angular direction information, can be measured in, or equivalently converted into, polar coordinates (column 7, lines 46-59)

It would have been obvious to one having ordinary skill in the art to modify the invention of Stacey to include converting the position signal into polar coordinates, as taught by Pryor, because, as suggested by Pryor, the combination would have provided accurate, fast, and smooth measurements when the detector of the invention is measuring position information of a concave surface (column 4, lines 49-57).

Maejima teaches a linear position detector comprising a scale (i.e. a recording medium) that contains a periodic position signal (column 3, lines 54-62 and Figure 3A) read by a pair of detecting heads to detect the longitudinal movement of the scale with respect to each head (column 3, lines 21-24), wherein the second

detection head receives a separate signal from the first signal (column 4, lines 10-19) and is spaced apart by a predetermined distance to maintain a phase difference (column 3, lines 43-46). Further, since the detecting heads read a specific periodic signal from the recording medium, it is inherent that the detecting heads travel in the recording direction of the medium.

It would have been obvious to one having ordinary skill in the art to modify the invention of Stacey to include specifying that the detection section comprise two detection heads, spaced apart, that move along a recording medium to read a periodic position signal, as taught by Maejima, because, as suggested by Maejima, the combination would have provided the placement of the two detecting heads, specifically (m+ ¼)λ apart where λ is a recording wavelength of the scale, so as to obtain two separate signals that provide the necessary phase difference needed to calculate the displacement of the scale (column 2, lines 14-20).

3. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stacey in view of Pryor and Maejima, and further in view of U.S. Patent No. 5,852,413 to Bacchi et al.

As noted above, Stacey in combination with Pryor and Maejima teach all of the features of the claimed invention, except for designating the received position signal as an address, and using a table to look-up the corresponding gray-coded angle.

Bacchi teaches an improved position encoding apparatus that conveys, positions, and orients a semiconductor wafer (column 3, lines 1-4) by converting

detected position signals to angular data, using a look-up table that lists the angles and corresponding signal addresses (column 8, lines 19-36), before conveying the angular position information to an angular position register (column 6, lines 34-47). Bacchi also teaches using gray-coded data for the look-up table in a device that is operable to store the gray code encoders using more that three bits of data (column 2, lines 30-34).

It would have been obvious to one having ordinary skill in the art to modify the invention of Stacey, Pryor, and Maejima to include designating the received position signal as an address, and using a table to look-up the corresponding gray-coded angle, as taught by Bacchi, because, as suggested by Bacchi, the combination would have provided a rapid, high resolution (column 2, lines 33-34), and highly accurate (column 6, lines 48-63) method of determining the angular positions of the device.

4. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stacey, in view of Pryor and Maejima, and further in view of the applicant's admitted prior art.

As noted above, the invention of Stacey, Pryor, and Maejima teach all the features of the claimed invention except for specifying that the processing functions of the invention be included in an arithmetic processing unit.

In the background of the invention, the applicant admits as prior art, a well known position detecting apparatus for detecting a position of movement of two members

which move relative to each other, comprising a scale on which a periodic signal is recorded, a head section for detecting the periodic signal recorded on the scale, and an arithmetic processing section for performing signal processing of the periodic signal, to output position information (page 1, lines 9-15). The applicant also admits as prior art that the arithmetic processing section processing of the well known position detecting apparatus include a polar conversion section to form an angle signal, and low pass filtering section (page 2, lines 3-5, 8-10, and 11-13).

It would have been obvious to one having ordinary skill in the art to modify the invention of Stacey, Pryor, and Maejima to include specifying that the processing functions of the invention be included in an arithmetic processing unit, as taught by the applicant's admitted prior art, because it would have provided a packaged processing device needed for performing the functions of the position detecting apparatus.

Claim Objections

5. Claims 2-13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

6. Applicant's arguments filed 30 October 2002 have been fully considered but they are not persuasive.

Applicant first argues "that the sensor configuration of Pryor et al. (see Pryor et al., col. 7, lns. 46-60) relates to the measurement of surface features of an object being measured, and does not suggest or disclose a polar conversion section for converting a position signal detected by a first detection head and a second detection head into an angle signal that represents a relative position of a recording medium and a detection section as an angle, as recited in the present invention." The Examiner maintains, however, that Pryor is only included to teach the feature of polar conversion, not the specifics of including first and second detection heads, etc. The Examiner also contends that in the invention of Pryor the sensors are used to measure position (column 7, lines 28-46).

Applicant then argues the rejection of claim 1 because "none of the cited references, alone or in combination, suggest or disclose the passing of angle data obtained by polar conversion of a position signal through a specially constructed low pass filter to enable accurate filtering, as recited in the present application." The Examiner contends that this limitation is not claimed as such and is instead claimed as "a low pass filter for removing a high frequency component in said angle signal output from said polar conversion section to output and angle signal having a frequency such that a phase error is zero" and this limitation is taught by the combination of Stacy, which teaches a phase locked loop adjusted to keep the phase error exactly zero, and Pryor, which teaches the use of a polar conversion section.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent No. 5,055,801 to Koga et al. teaches a digital phase locked loop for correcting a phase of an output signal with respect to an input signal comprising a phase comparator that outputs a signal to an integrator, two amplifiers, and a voltage controlled oscillator, wherein the voltage controlled oscillator feeds back its output to the phase comparator.

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Jeffrey R. West whose telephone number is (703)308-1309. The examiner can normally be reached on Monday thru Friday, 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S. Hoff can be reached on (703)308-1677. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7382 for regular communications and (703)308-7382 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

jrw
January 26, 2003

MARC S. HOFF
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800